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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/762,075

01/21/2004

Joon-seo Son

90066.000371/FS18851US

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7590

11/15/2005

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EXAMINER

GEBREMARIAM, SAMUEL A

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 11/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/762,075

Applicant(s)

SON ET AL

Examiner

Samuel A. Gebremariam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

2. Claim 10 is objected to because of the following informalities: Line 6, the proposition "of" is missing after the word "surface". Line 7, the expression "to from" appears to be a typographical error. Appropriate correction is required.

Claim 11 recites the limitation "lateral lead" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 18 recites the limitation "one of the inclination portion" in lines 1 and 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 34 recites the limitation "the lateral lead" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 33 recites the limitation of "the lead" in line 17. There

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are first, second and third leads in the body of the claim. It is not clear which lead the claim is referring to.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

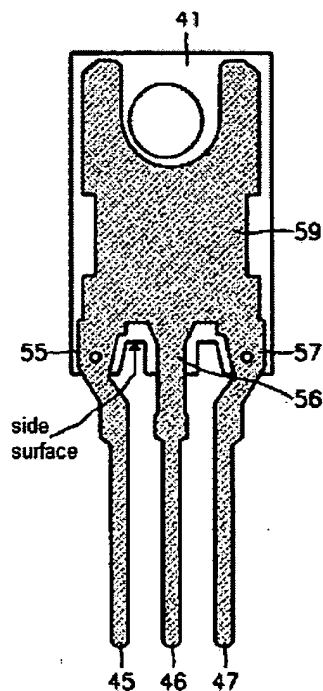
(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

6. Claims 10-11, 13-15, 17, 19-20, 22-23, 25-26, 29-30, 33-34 and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by admitted prior art (APA).

Regarding claim 10, APA teaches (figs. 4 and 5) a packaged semiconductor device comprising: a semiconductor die (not shown); a lead frame pad for supporting the semiconductor die; a molded housing (41) encapsulating the lead frame pad (59) and the semiconductor die (not shown); a plurality of elongated leads (45, 46, 47) each having an inner portion extending from a first end inside of the molded housing (41), protruding through a side surface (refer to the drawing below) the molded housing and terminating at a second end outside the housing to form an outer portion of each lead, wherein a first lead (46) is disposed with its inner portion in a central region of the molded housing (41) and second (45) and third (47) leads are respectively disposed on opposite lateral sides of the central lead (46), wherein the second (45) and third (47) leads each have a bent region along their respective lengths (refer to fig. 5), the bent

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regions being adjacent to the side surface (refer to the figure below) of the molded housing (41), the bent portions formed to increase a space between the first outer lead and the second and third leads, wherein the molded housing (41) is continuous between adjacent leads (inside regions above the side surface the molded housing 41 is continuous) inside the side surface of the packaged semiconductor device and is at least partially discontinuous (the molded package is partially discontinuous below the side surface region) between at least two adjacent leads in a region of the leads outside the side surface of the packaged semiconductor device (refer to figs. 4 and 5).



Regarding claim 11, APA teaches the entire claimed structure of claim 10 above including the bent region of the lateral lead protrudes beyond the side surface of the molded housing.

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Regarding claim 13, APA teaches the entire claimed structure of claim 10 above including a depression which is depressed toward a body of the molded housing (41) is formed on at least one of a surface of the molded housing between the first outer lead (45) and the second outer lead (46) and a surface of the molded housing between the first outer lead (45) and the third outer lead (47) (APA, page 2, lines 19-26).

Regarding claim 14, APA teaches (figs. 4 and 5) a semiconductor package in which a lead frame pad (59) to which a semiconductor die (not shown) is attached and inner leads (portions of 45,46,47 that are inside of 41) electrically connected to the lead frame pad (59) are covered by a molded housing (41), and outer leads (45,46,47) extended from the inner leads protrude from a side surface (refer to figure above) of the molded housing (41) to the outside, wherein the outer leads include a first outer lead (46) disposed in a central portion of the molded housing (41), second (45) and third (47) outer leads respectively disposed in a right and left of the first outer lead, wherein the second (45) and third (47) leads each have a bent region along their respective lengths (refer to figs 4 and 5), the bent regions being adjacent to the side surface of the molded housing (41), the bent portions formed to increase a space between the first (46) outer lead and the bent portions of the second (45) and third (47) leads, wherein the molded housing (41) is continuous between adjacent leads (41 is continuous inside the side surface, figs. 4 and 5) inside the side surface of the packaged semiconductor device and is at least partially discontinuous between at least two adjacent leads in a region of the leads outside the side surface of the packaged semiconductor device (refer to figs. 4 and 5).

Regarding claims 15 and 17, APA teaches the entire claimed structure of claims 13 and 14 above including a portion where the first (46) outer lead is adjacent to the side surface (refer to figure above) of the molded housing (41) and is covered by the extended portion of the molded housing (refer to fig. 5, where 46 is covered by the extended portion of the molded housing).

Regarding claim 19, APA teaches (figs. 4 and 5) a semiconductor package in which a lead frame pad (59) to which a semiconductor die is attached (not shown) and inner leads (55,56,57) electrically connected to the lead frame pad (page 2, lines 19-26) are covered by a molded housing (41), and outer leads (45,46,47) extending from the inner leads protrude from a side surface (refer to figure above) of the molded housing (41) to the outside, wherein the outer leads include a first (45) and second (47) lead, wherein at least one of the first (45) and second (47) outer leads is covered by an extended portion of the molded housing (41) where the extended portion is adjacent to the side surface of the molded housing (figs 4 and 5).

Regarding claim 20, APA teaches the entire claimed structure of claims 19 above including the second lead has a bent portion in a region adjacent to the side surface of the molded housing (41), the bent portion protruding to increase a space between the first (45) outer lead and the bent portion in the molded housing (figs. 4 and 5).

Regarding claim 22, APA teaches the entire claimed structure of claims 19 above including a depression which is depressed toward a body of the molded housing is formed on the surface of the molded housing between the first (45) outer lead and the second (47) outer lead (APA, page 2, lines 19-26).

Regarding claim 23, APA teaches the entire claimed structure of claims 19 above including the second lead (47) has a bent portion in a portion where it is adjacent to the side surface of the molded housing (41), the bent portion protruding to increase a space between the first outer lead (45) and the bent portion in the molded housing (refer to figs. 4 and 5).

Regarding claim 25, APA teaches (figs. 4 and 5) the entire claimed structure of claim 19 above including a third lead (46), wherein the third lead (46) is disposed in a central portion of the molded housing and the first (45) and second (47) outer leads respectively are disposed to the right and left of the third lead (46).

Regarding claims 26 and 29, APA teaches (figs. 4 and 5) the entire claimed structure of claims 13, 19 and 25 above including at least one of the first (45) and second (47) leads has a bent portion (refer to figs. 4 and 5) in a region where the leads are adjacent to the side surface of the molded housing, the bent portion protruding to increase a space between the first outer lead and the bent portion in the molded housing (refer to figure 4 and 5).

Regarding claim 30, APA teaches (figs. 4 and 5) the entire claimed structure of claims 19 and 29 above including at least one of the first (45) and second (47) outer leads has a bent portion (refer to figs. 4 and 5) in a region where it is adjacent to the side surface of the molded housing, the bent portion protruding to increase a space between the third (46) outer lead and the bent portion in the molded housing (41).

Regarding claims 33 and 36, as best the examiner is able to ascertain the claimed invention, APA teaches the entire claimed structure of claims 10 and 13 above

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including a region outside the side surface (refer to figure above) a portion of the molding housing (41) extends longitudinally from the side surface to cover a portion of the leads adjacent and outside the side surface and the molding housing (41) extends partially laterally toward an adjacent lead to leave at least a partial void (region where the leads protrude the molding compound) of molding housing in a lateral direction between the partially covered lead and the adjacent lead.

Regarding claim 34, APA teaches the entire claimed structure of claim 33 above including the bent region of the lateral lead protrudes beyond the side surface of the molding housing (41, refer to figs. 4 and 5).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 12, 16, 18 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA.

Regarding claims 12, 16 and 35, APA teaches substantially the entire claimed structure of claims 10 and 14 above except explicitly stating that a distance between a surface of the molded housing covering the portion of the first outer lead and a surface of the molded housing covering at least one of the bent (inclination) portions of the second and third outer leads is 1 mm or more.

Parameters such as width and length in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired device characteristics during fabrication.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the distance between a surface of the molded housing covering the portion of the first outer lead and a surface of the molded housing covering at least one of the bent portions of the second and third outer leads in the structure of APA as claimed in order to form a package with increased reliability.

Regarding claim 18, APA teaches substantially the entire claimed structure of claims 10 and 14 above including that one of the inclination portions of the second (45) and third (47) outer leads includes a portion which is perpendicular to a surface of the molded housing and a flat portion (refer to figs. 4 and 5).

APA does explicitly teach the flat portion is larger than a thickness of the molded housing covering the inclination portions in a boundary between the inclination portions and the molded housing.

Parameters such as thickness and length in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired device characteristics during fabrication.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the flat portion relative the thickness of the molded housing as claimed in order to form a package with increased reliability.

Claims 21, 24, 27-28, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA in view of Gagnon, US patent No. 5,859,387.

Regarding claims 21 and 24, APA teaches substantially the entire claimed structure of claims 19 and 22 above except explicitly stating that the second lead has an inclination portion in which a distance between the first outer lead and the inclination portion becomes larger as a distance between the inclination portion and the side surface of the molded housing becomes smaller, and wherein the inclination portion is covered by the extended portion of the molded housing.

Gagnon teaches (fig. 1) the second lead (16) having an inclination portion (fig. 1) portion in which a distance between the first outer lead (12) and the inclination portion becomes larger as a distance between the inclination portion and the side surface of the molded housing (plastic package) becomes smaller, and wherein the inclination portion is covered by the extended portion of the molded housing (refer to fig. 1).

Furthermore parameters such as width and length in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired device characteristics during fabrication.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust distance between the first outer lead and the inclination portion and the inclination portion and the side surface of the molded housing as claimed in order to form a package with increased reliability.

Regarding claims 27-28 and 31-32, APA teaches substantially the entire claimed structure of claims 18-19, 21, 24-25, 29 and 31 above including that at least one of first

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(45) and second (47) leads includes an inclination portion in which a distance between the third (46), central lead and the inclination portion becomes larger as a distance between the inclination portion and the side surface of the molded housing becomes smaller and wherein the inclination portion is covered by the extended portion of the molded housing (also refer to fig. 1 of Gagnon).

Response to Arguments

9. Applicant's arguments with respect to claims 10-36 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A Gebremariam whose telephone number is (571) 272-1653. The examiner can normally be reached on 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAG
November 7, 2005



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